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Article

Entrepreneurial ecosystem—Industrial parks as catalysts for strengthening ventures' capability: Evidence from Ethiopian small manufacturing enterprises

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Abstract: Small-scale businesses have long been recognized as an important part of economic development and integrating them with industrial parks is both recommended and necessary for long-term success. In line of this, the objective of this study was to investigate the role of IPs entrepreneurial ecosystem in boosting the capabilities of small businesses. Data were collected from 245 small manufacturing business owners via simple random sampling and analysed using multivariate regression analysis. Thus, the ability of small enterprises is positively impacted by the presence of a more robust and appropriate entrepreneurial ecosystem. Similarly, a firm's resource capabilities are more impacted by the entrepreneurial ecosystem when there is a better link between academia and industry. Furthermore, entrepreneurial skills are found to play a mediating role between the entrepreneurial ecosystem and firms' technological capabilities. Another finding revealed that managerial expertise significantly mediates entrepreneurial ecosystems and firms' resource capabilities. This finding suggested that the policymakers, better to formulate policies that encourages small businesses to engage in the industrial parks which results in an inclusive firm's performance.

Keywords: academia-industry-linkage; entrepreneurial ecosystem; firm capability; industrial parks; small manufacturing enterprises

1. Introduction

Firm capability includes aspects that improve a private venture's understanding of major opportunities and risks, as well as its determination to achieve goals (Kamasak, 2017). It is defined as firm abilities embedded in firm endeavors and it is linked to managerial capacities and initiative (Paraschiv et al., 2012), technological capabilities (Yol and Rhee, 2007), efficiency (Audretsch et al., 2024), and firms' resources (Portillo-Tarragona et al., 2018). Capabilities can be a source of competitive advantage in the entrepreneurial ecosystem since they determine the acquisition, development, and deployment of the rest of the resources and capabilities (Camisón et al., 2018). In a dynamically changing commercial setting, these resources are a set of knowledge, skill, experience, and capacity to pick technologies, set up, run, assimilate, sustain, progress, and extend new values to processes and products (Ahmad et al., 2014). Human capital, for example, is critical to a company's development and maintenance of capabilities (Costa et al., 2019).

Entrepreneurial ecosystems are made up of a mix of social, political, economic, and cultural factors that encourage the establishment and growth of businesses (Dell

et al., 2024; Nieves and Haller, 2014) considered as a critical resource for the realization of several critical competencies (Costa et al., 2019). Industrial parks are crucial for enhancing venture capabilities and the entrepreneurial environment. Research highlights the importance of incorporating factors like academia-industry linkage (AIL) in industrial parks to promote the growth of enterprises (Chebo and Gebrekidan, 2022). Furthermore, studies show that industrial parks can help small and medium-sized businesses remain sustainable by fostering competition, which raises innovation levels, and by offering financial incentives from the government to reduce operating costs (Onodugo et al., 2023). In a similar sense, research conducted by Lyu et al. (2023) revealed that, higher network centrality gives enterprises location advantage, enabling access to information and resources, facilitating open innovation and product development. Business research highlights interorganizational relationships and economic influences on individuals and organizations causes entrepreneurial ecosystem and focuses on entrepreneurial ecosystems, where entrepreneurs are influenced by location-specific factors (Aulet, 2024).

Ethiopia is envisaging being an industrial and a middle-income country by 2025, and high-income country within the next four to five decades. And later, it formulated GTP I and GTP II. The first Growth and Transformation Plan (GTP I) is ended. The next GTP-II is underway, which focused, among other, to transform its economy from agricultural-led to industrial–led economy (Weldesilassie et al, 2017). Therefore, with the support of appropriate entrepreneurial ecosystem, industrial parks will continue to change with the economy around them and will remain an important tool for integrating indigenous and foreign investment together to create the linkages that stimulate industrial and economic development (Brennan, 2012; Isenberg, 2013; Spigel and Stam, 2018; World Economic Forum, 2013). Moreover, Ethiopia is building industrial parks with associated basic infrastructures to attract investment in the manufacturing sector (Geda & Legesse, 2022).

In this practice, the government provides several incentives to firms located in the industrial parks envisaged to establish additional industrial parks across economic corridors of the country (MoFED, 2017). Furthermore, it is also recognized that the importance of linkage of higher education institutions with small firms for a given country is crucial. Experience demonstrates that a mutual integration between university and industry can foster the development of the communities in which both are operating (Yilma and Alemu, 2018).

Firms at the global level are facing many challenges in the forms of market uncertainty, human and financial capital and increase in both local and international competition (Raghuvanshi and Garg, 2018; Al Mamun, 2019). Besides, the firm-level capabilities can be difficult to imitate because these systems involve routines that are firm-specific, socially complex, and path-dependent (Kor and Leblebici, 2005). Therefore, there is a necessity for industrial parks entrepreneurial ecosystem development towards improvement of small firm's capability. Improvement in small enterprises capability can be highly impacted by several factors, among these the crucial ones are the entrepreneurial ecosystem, academia-industry linkage, managerial knowledge and entrepreneurial skill. Unfortunately, these variables remain understudied in developing countries. Even though, this evidence is obtained from other countries the researchers cannot access similar evidence in Ethiopia.

One of the problems we have been witnessing is that small firms are isolated from the industrial parks due to limited finance, experience in an industry/manufacturing centre, operations scale, improper policy, and so forth. On the other hand, Yilma and Alemu (2018) research outcome revealed that the linkage between universities and industries seems to be very weak particularly in developing countries. We also identified that the practice of academia-industry linkage (AIL) is very week in Ethiopia, even if the institution that coordinate this issue is established in public universities. With these challenges, increasing the number of high growth and capable firms is now a major focus for industry policy. However, existing approaches are proving ineffectiveness (Mason and Brown, 2014).

Theoretically, the relationship between industrial parks entrepreneurial ecosystem, firms' capability and academia-industry linkage which forgotten by previous studies was researched in this study. Therefore, this study is aimed at investigating the entrepreneurial ecosystem in industrial parks in strengthening the capability of small venture. The study further tests the role of academia-industry linkage, managerial knowledge, and entrepreneurship skill on the relationship between industrial parks entrepreneurial ecosystem and improvement in ventures capability. Besides, there are many studies that studied the influence of firm capability on competitive advantage (e.g., Al Mamun (2019)) and performance (Kamasak, 2017). Moreover, there is a lack of studies that identifies the building block of firm capability. Besides, before going further relationship with competitive advantage and performance, we found the necessity to test the role of managerial knowledge and entrepreneurial skills on building and improving firms' capability. Therefor this study revealed the determining factors of firm's capability and the role of managerial knowledge and entrepreneurial skill. Therefore, this study is aimed at investigating the industrial parks entrepreneurial ecosystem on firms' capability improvement, with a specific role of AIL, managerial knowledge, and managerial skill, specifically, this study emphasized on addressing the following research questions; (1) To what extent IPs entrepreneurial ecosystem affects firms' capability? (2) What other factors have influenced the relationship between IPs entrepreneurial ecosystem and firms' capabilities?

2. Theory and hypothesis

2.1. Entrepreneurial ecosystem in industrial parks

To achieve the innovation capability and R&D assistance of small and medium-sized firms (SMEs), industrial parks are designed and developed with the provision of physical infrastructure for enterprise usage (Park et al., 2016). Stakeholders such as buyers, manufacturers, and suppliers can all work in the same place in an industrial park, reducing transaction costs and establishing new rules and norms of entrepreneurial behaviour (UNIDO.ORG, 2012). Since the SMEs have the restrictions of labor and money, it is difficult for them to seek for the potential fields autonomously (Park et al., 2016). As a result, the creation of industrial parks has undoubtedly improved the entrepreneurial ecosystem. Furthermore, entrepreneurial ecosystems resemble industrial districts, clusters, and innovation systems; entrepreneurs and spin-offs are present in these other frameworks, but they are not as fundamental as they are

in entrepreneurial ecosystems (Stam and Spigel, 2018).

The entrepreneurial ecosystem is an assortment of interrelated entrepreneurial actors, organizations, institutions, and processes that formally and informally converge to connect, mediate, and manage the performance of local entrepreneurs (Masson and Brown, 2014). According to Acs et al. (2017), entrepreneurial ecosystems emerged from literatures in both company strategy and regional development.

2.2. Firms' capability

Capabilities refer to a company's capacity to effectively combine a variety of resources to engage in productive activity and achieve a certain goal (Amit and Schoemaker, 1993). This logic implies that capabilities are an 'intermediate transformation ability' between resources and goals (Audretsch et al., 2024). Teece and Pisano (1994) argue that it is a subset of the firm's core competencies that allow it to create new products and processes and respond to changing market environment, whereas Eisenhardt and Martin (2000) argue that it is the firm's processes that use resources—specifically the processes to integrate, reconfigure, gain, and release resources—to match or even adapt market change. Capabilities, in general, are a unique blend of organizational processes that collect strategic knowledge and contribute to improved business performance (Ketata et al., 2015).

A successful large corporation derives competitive strength from its excellence in a small number of capabilities clusters (Dosi et al., 2000), which might be useful for small firms too. Firms' capability can be considered as Organizational capabilities embedded in firm routines and associated with managerial capabilities (Paraschiv et al., 2012), Technological capabilities (Yol and Rhee, 2007), efficiency (Audretsch et al., 2024), product delivery and firms' resources (Portillo-Tarragona et al., 2018). Therefore, the firm's improvement may include technological capabilities, firm's resource capabilities, marketing capabilities etc. For instance, organizational capability that can confer to the firm ability to adopt industrial innovations, is a technological capability (Bustinza et al., 2019).

Companies must have technological capabilities to get a competitive advantage (Antonio et al., 2024). They exist as part of a set of additional organizational competencies that enable companies and individuals adapt more effectively to changes (Bustinza et al., 2019). Furthermore, enterprises with technological capabilities can successfully adapt technology that allows them to implement new production processes and, as a result, overcome problems associated with the usage of outdated production systems (Bustinza et al., 2019). An in-depth examination of the projects, on the other hand, indicated a definite link between the enterprises' resources and competencies (Portillo-Tarragona et al., 2018). Because of "their potential to deploy resources, usually in combination, through organizational processes, to effect a desired end," capabilities are regarded a "superior" resource (Kamasak, 2017).

2.3. The role of IPs entrepreneurial ecosystem on firms' capability improvement

Micro and small businesses, as the engines of indigenous entrepreneurship, play

a critical role in the global economy's development through enhancing technological capability, innovation dissemination, and capital mobilization (Endris and Kassegn, 2022). IPs are also thought to play a favorable influence in economic development (Xie et al., 2013) by enhancing the capabilities of small businesses. Improved SME competitiveness (affected by company capabilities) could, thus, contribute to economic and social growth as well as poverty alleviation (OECD, 2004). Small, medium, and even large businesses can benefit from improved capabilities obtained from public infrastructures, save money on construction and common facilities, and gain access to nearby skilled labor markets, research and educational facilities, and other critical inputs by clustering in to industrial parks (Lyu et al., 2023) also argues that, venture capital significantly promotes enterprise open innovation, especially when institutions have industry experience, higher shareholding ratios, and syndicated shares.

Industrial parks also encourage and assist small businesses in participating effectively in national dialogues that help set strategic development frameworks (OECD, 2004); provide an institutional framework, modern services and physical infrastructure; and improve relationships between different actors (UNIDO.ORG, 2012), all of which can help small businesses improve their capabilities. From this, we proposed that;

H1: As IPs entrepreneurial ecosystem becomes better, the better firms' capability.

2.4. The moderating role of UIL

Collaborative capabilities have been considered significant by several authors; because of these capabilities, firms actively collaborate with research institutes, agencies and universities (Portillo-Tarragona et al., 2018). Like a cluster, an entrepreneurial ecosystem also involves as key actors of several other entities, including large firms, universities, financial firms, and public organizations that support new and growing firms (Brown and Mason, 2017). Therefore, the interaction of academia with industry provides consultancy, joint research & development or training (D'Este and Patel, 2007), incubation centres (Brennan, 2012), flow of knowledge and technology amongst universities, collaboration development & techno-parks, and technology transfer offices (Kaymaz and Eryigit, 2011). However, such systems often struggle to integrate with the regional/industrial entrepreneurial ecosystem (Audretsch et al., 2024). Parks are thus a useful tool to establish value added links between academic research and industry (UNIDO.ORG, 2012). Understanding the nature of relationships between academic institutions and SMEs is therefore important, since concentrations of SMEs in certain regions, clustered around one or more university centres, can be effective locations for accelerating this process (Hendry, 2000).

Companies may obtain innovation-related knowledge and technologies from academic institutions through engaging in academia-industry linkages (Bozeman, 2000; Feldman et al., 2002; Liu, 2009). Theoretically, the more that related firms cluster together, the lower the cost of production, and the greater the market in which the firms can sell (Hu et al., 2011). The study of Gulbrandsen and Solesvik (2015) provides insights into how different universities with different resource endowments

and knowledge bases identify, pursue and exploit opportunities related to cooperation with firms from their industrial clusters which can provide access to essential resources, competencies, knowledge and legitimacy. It is widely recognized that universities and other public research institutions play a central role within systems of innovation for basic research generation, technology transfer and knowledge diffusion to firms (Archibugi and Filippetti, 2017; Thursby and Thursby, 2011; Filippetti and Savona, 2017; Ukhurebor et al., 2024). The knowledge created through research can solve the industrial problems (Etzkowitz and Leydesdorff, 1997). Therefore, the development of industrial links with academia can promote the innovation and the production (Westhead and Storey, 1994; Bhutto and Lohana, 2018). Several studies proved the growth of those companies which have strong linkages with academia in comparison to those which do not have such linkages (Malairaja and Zawdie, 2008). Therefore, we hypothesized that;

H2: The existence of academia-industry linkage in industrial parks intensifies the influence of IPs entrepreneurial ecosystem on the improvement of small firm's capability.

2.5. The role of entrepreneurship skill

Capabilities are commonly thought of as the most crucial capabilities that drive resource development and deployment (Molloy and Barney, 2015). Teece (2012) claimed that entrepreneurial skills, which include identifying, seizing, and changing opportunities, are necessary attributes for developing dynamic capabilities. Specific characteristics of capabilities include a firm's ability to build organizational systems that encourage skill development (Camisón et al., 2018). According to Phelan and Sharpley (2012), entrepreneurs need a variety of abilities to acquire certain competencies to run a business. Essentially, entrepreneurs must learn a set of skills from the entrepreneurial environment to update their views about entrepreneurial aptitude (Entrialgo and Iglesias, 2016). Then, these entrepreneurial abilities encourage people to feel competent and start their own business (Al Mamun, 2019). The result is that small organizations must make efficient use of organizational capabilities such as management systems, personnel knowledge and skills, and values and conventions (Kamasak, 2017).

Technological competence is a term that refers to a company's system of activities, physical systems, skills and knowledge bases, managerial learning and incentive systems, and values that generate exceptional value (Ahmad et al., 2014). Furthermore, RBV was used to highlight the benefits of entrepreneurial skills on entrepreneurial skills, as practices and know-how induce unique capabilities in the firm (Al Mamun, 2019). The RBV theory reveals that businesses have resources, skills and knowledge that are different among firms (Barney, 2001; Kamasak, 2017), which developed from the organized entrepreneurial ecosystem. Therefore,

H3: The entrepreneurial skill mediates the relationship between IPs entrepreneurial ecosystem and small firm's capability improvement.

2.6. The role of managerial knowledge

According to Koontz's (1976) definition of management, managerial knowledge

can be defined as knowledge of "the art of getting things done through or/and with people" (as cited in Bosch and Van Wijk, 2000). Managerial capacities are produced through activities that utilize managers' tacit knowledge (Camisón et al., 2018). Knowledge-based resources, such as innovation, marketing, and various manufacturing skills, are essential business assets (Kamasak, 2017). The absorptive capacity, which is the ability to absorb external knowledge and use it for commercial reasons, is one of the most important (Costa et al., 2019). Castanias and Helfat (1991) use Katz's (1955) classification to distinguish the distinct skills of a manager in explaining top management's rent-generating capacity as important for the formation of cultural resources and organizational capacities (Bosch and Van Wijk, 2000).

Technological capabilities are a knowledge-based complete collection of organizational capabilities that enable a company to find, recognize, organize, apply, and market new goods and services (Bustinza et al., 2019). This means that administrative expertise is required for technological skills. That is, managers' knowledge enables them to obtain a competitive advantage (Costa et al., 2019). Furthermore, the know-what, know-how, know-why, know-who, know-where, and know-when knowledge components of management knowledge can be contested (Bosch and Van Wijk, 2000).

To achieve greatness, a company's senior management must possess a diverse range of complementary talents. A single person, no matter how gifted, is unlikely to possess all of the managerial talents required to run a major firm successfully (Carmeli and Tishler, 2004). However, because managers differ, they will have diverse information bases, causing them to make various decisions (Marimuthu and Kolandaisamy, 2009). That is, having a diverse set of managerial talents allows a company to use specialized skills to deal with specific scenarios. 'The features of the management team may satisfy the prerequisites for obtaining and maintaining competitive advantage,' according to Carmeli and Tishler, (2004). However, before the firm can gain a competitive advantage, it must strengthen its capabilities through managerial expertise generated in a favourable entrepreneurial ecosystem.

H4: The managerial knowledge mediates the relationship between IPs entrepreneurial ecosystem and small firm's resource capability improvement (**Figure 1**).

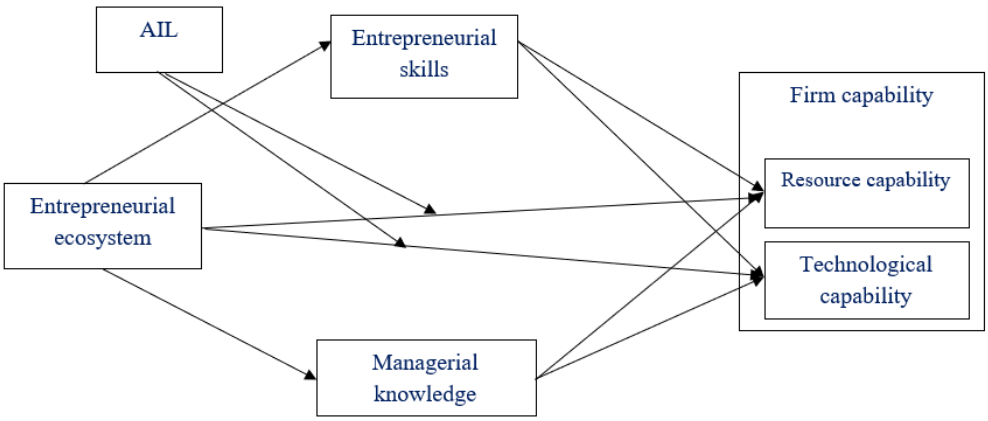

Figure 1. Conceptual framework.

3. Methodology

3.1. Research design

The design of the study was both Descriptive and causal. It mainly aims at describing the existing situation in the integration between small business enterprises and industrial parks. It also explains what factors determine small firm's capacity improvement. In top of this, the study has formulated a functional framework for industrial parks entrepreneurial ecosystem and firm's capability improvement.

3.2. Sampling techniques and sample size determination

The study's population consisted of small manufacturing firms in Ethiopia. According to the Addis Ababa city administration micro and small-scale enterprise development office (AAMSSEDO, 2018), there were 8697 micro and small manufacturing enterprises in the city. A total of 378 samples were taken, and the same number of questionnaires were distributed. Concerning the sampling size, Taro Yamane's formula was adopted to determine the sample size for this study. Out of these 245 (approximately 65% of 378) were filled and returned to the researchers. Thus, the analysis of the questionnaire was done based on these data.

Simple random sampling technique was found appropriate for this study (to gather data through questionnaire). The reason to adopt SRS was nature of the target population, the population was small manufacturing firms' owners. This technique offers equal participation for each element.

3.3. Measurement

Various authors related firm's capability from various perspectives. For instance, (Costa et al., 2019; Kamasak, 2017; Portillo-Tarragona et al., 2018) associated with efficient use of resources. Other authors such as Lee and Rhee (2007); Vitorino Filho et al. (2018) and Bustinza et al. (2019) considers technological capabilities, while Camisón-Haba et al. (2018) associated with product delivery. For this study, particularly we have focused on the technological and firm resources capability. Accordingly, we asked the respondents to rate the level of their firm's resources and technological capabilities on the five-point Likert scale.

Despite its popularity, there is not yet a widely shared definition of entrepreneurial ecosystems amongst researchers. However, Isenberg identifies six domains with entrepreneurial ecosystem such as a conducive culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture friendly markets for products, and a range of institutional supports (Isenberg, 2013). Besides, the question of the level at which entrepreneurial ecosystem operate has not been answered yet. This would depend on the spatial scale on which the elements are achieved, on the one hand, and how they are limited, on the other hand (Stam and Bosma, 2015). From the various discussion made on the issue previously, seven items associated with the above domains were developed and asked to be rated on the five-point Likert scale compared to the entrepreneurial ecosystem of the industrial parks. These items particularly contain questions related to infrastructure, government support, market access, access to human capital, reputation, risk minimization, and

access to resources.

The academia industry linkage has measure with multi-item questionnaire in most research. In this study the purpose of measurement is related with whether the academia-industry linkage intensifies the relationship between the entrepreneurial ecosystem and firms' capability. Therefore, we developed a single item that asks respondents to rate the level of linkage with academic institutions. Similarly, the entrepreneurial skill and managerial knowledge were also asked to rate on the five-point Likert scale (**Table 1**).

Table 1. Variables definition.

Variables	Descriptions	Source/s
Entrepreneurship ecosystem	The entrepreneurship ecosystem consists of a set of individual elements—such as leadership, culture, capital markets, and open-minded customers—that combine in complex ways.	Isenberg (2013)
Firms' capability	Capabilities enable companies to configure, exploit and possibly renovate (i.e., dynamic capabilities, resource capabilities, technological capabilities).	Montresor (2004)
Industrial Park/s	Is a park founded on the idea that somewhat disparate functions (such as industry, leisure, and education) should be integrated into an industrial region where most activities are industrial production and services with substantial employment and economic turnover.	Vidová (2010)
Academia Industry Linkage	Is the interaction between industry and academic institutions or public research centers to solve technical issues, work on innovations, research and development (R&D), or collection of scientific and/or technological knowledge.	Rodríguez and Bielous (2016)
Entrepreneurial Skills	Refers to the activities or know-how that can establish and operate an enterprise successfully.	Liñán and Chen (2009)
Managerial Knowledge	The process of transferring information and intellectual assets to a stable value.	Firestone (2003)

3.4. Data quality assurance and analysis

The primary data collected using questionnaire were coded and entered to SPSS software for analysis. The collected data were then analysed using SPSS Version 24, which was used to analyse descriptive and hierarchical regression analysis. OLS regression analysis was undertaken to show the moderating impact of academia-industry-linkage, managerial knowledge, and entrepreneurial skill. To achieve this objective, a four-stage hierarchical regression analysis was undertaken. In the first stage controlling variables were included. Next, the main effect and the moderators were added and lastly, the interaction variables of main effects and moderators were added to the analysis. The ANOVA result shows that the model was fitted significantly in all the four models. Finally, based on the outcome, discussion and interpretation were performed by the researchers.

The measurement instruments are tested for validity and reliability before analysis were made for completeness and compatibility with the purpose of the study. Their reliability and validity of the data was tested. To ensure validity a pilot study was undertaken and for the test reliability, Cronbach's Alpha test was used. Accordingly, the Cronbach's alpha test was more for all items. With this, we can say that questionnaires were reliable enough. Moreover, by looking to the tolerance and VIF level, we confirmed that multicollinearity is not a concern, since all tolerance values are above 0.1 and VIF are less than 5.

4. Results and discussion

4.1. The extent of industrial parks entrepreneurial ecosystem, academia industry linkage and firms' capability

By looking to other countries experience such as China, Malaysia and Singapore, entrepreneurial ecosystem in Industrial parks requires a strong government commitment, formulating functional procedures and legislations, providing social facilities, building cheap industrial sites (Stam, 2016). Similarly, in order to enhance entrepreneurial ecosystem, it needs government focus in various areas such as capacity building of local companies and integrating firms with universities (Brown and Mason, 2017; Spigel and Stam, 2018). From the empirical study conducted, the descriptive study result (**Table 2**) revealed that all mean score, except for sectors are >3.3 and the standard deviation of all items, except for sector, size, and entrepreneurial skill are less than 1. That is a low standard deviation indicates that the data points tend to be very close to the mean. The mean values indicate low level of capabilities, managerial knowledge, entrepreneurial skills, industrial parks entrepreneurial ecosystem, and linkage with academia.

Table 2. Descriptive statistics result.

	Mean (S.D.)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Tech.Cap	3.382 (0.6777)	1							
Res.Cap.	3.355 (0.6377)	−0.184**	1						
Sectors	2.810 (1.484)	0.177**	0.033	1					
Size	4.400 (2.105)	−0.010	0.251**	−0.438**	1				
IPEE	3.487 (0.4682)	0.491**	−0.186**	0.141*	0.254**	1			
AIL	3.369 (0.5212)	−0.060	−0.039	0.142*	0.050	−0.005	1		
Mgt.Know	3.510 (0.8853)	−0.165**	−0.058	−0.354**	0.142	−0.130*	−0.174**	1	
Ent.Skill	3.402 (1.140)	−0.059	−0.072	−0.047	0.008	−0.018	0.118	0.406**	1

Source: SPSS Computation.

The highest correlation result is between is (β = 0.491, p < 0.05) (**Table 2**) between industrial parks entrepreneurial ecosystem and firms' technological capability. The dependent variable firm's technological capability improvement is significantly correlated with independent variables such as types of industry or their sector, industrial parks entrepreneurial ecosystem and entrepreneurial managerial knowledge. Similarly, firm's resource capability improvement is significantly correlated with firm's size and industrial parks entrepreneurial ecosystem.

Furthermore, both normality and linearity are important assumptions of multivariate analysis and thus need to be fulfilled. The Normality can be checked through observing the Normal P-P plots and standardized residual histograms. In Normal P-P plots, the standardized residual is compared with normal distribution represented by straight diagonal line, while in histograms the bell-shaped symmetrical curve is observed by having maximum scores in middle and lesser at edges (Appendix **Figures A1–A3**).

4.2. Entrepreneurial ecosystem and small ventures capability improvement

The results from **Table 3** indicates that when technological capability is a dependent variable, in the first model the controls alone explain the improvement in firms' capability is nothing, however it explains about 32.1% after all the variables. Similarly, when firm's resource capability is a dependent variable, the *R*-square value is about 39% in the fourth model. The interaction between entrepreneurial ecosystem and academia-industry linkage has no impact on the technology capability improvement, while there is significant influence on the resource capability improvement.

Table 3. Regression coefficient (multi-level regression analysis).

Dependent variable	Model	R^2 (F)	Sec	Size	IPEE	AIL	EE*AIL
Technological capability	1	R^2 = 0.000 F = 0.024	−0.009 (0.047)	−0.006 (0.034)			
	2	R^2 = 0.312 F = 17.095***	−0.078* (0.040)	−0.078** (0.030)	−0.809*** (0.113)		
	3	R^2 = 0.321 F = 13.21***	−0.062 (0.042)	−0.070** (0.031)	−0.789*** (0.114)	−0.157 (0.133)	
	4	R^2 = 0.321 F = 10.474***	−0.062 (0.043)	−0.070** (0.031)	−0.800 (0.542)	−0.135 (0.445)	−0.006 (0.286)
Resource capability	1	R^2 = 0.063 F = 3.825**	0.070 (0.038)	0.070** (0.028)			
	2	R^2 = 0.225 F = 10.923***	0.046* (0.035)	0.113*** (0.027)	−0.485*** (0.100)		
	3	R^2 = 0.226 F = 8.162***	0.050 (0.038)	0.115*** (0.027)	−0.491*** (0.101)	−0.043 (0.118)	
	4	R^2 = 0.389 F = 14.111***	0.068** (0.034)	0.134*** (0.025)	−2.767*** (0.428)	−4.526*** (0.831)	1.230*** (0.226)

Source: SPSS Computation.
Standard error in bracket.

Theoretically, a successful improvement of firm's capability requires the combination of various activities related to the entrepreneurial ecosystem. However, the foundations for this capability improvement and the contribution from the skills, knowledges and linkages to industrial parks entrepreneurial ecosystem were theoretical not linked. Particularly, the integrated effect of linkages and entrepreneurial ecosystem on the firm's capability improvement were under researched. Therefore, it's crucial to link these variables and test the direct and indirect effect of entrepreneurial ecosystem on the firm capability improvement. Particularly, this study provides the following empirically driven theoretical contributions.

The improvement of industrial parks entrepreneurial ecosystem was measured in terms of infrastructure, government support, market opportunity, pool of human capital, reputation, minimum risk, and access to other resources. The improvement in these factors in general will lead to improvement in these firm's capability. Entrepreneurial ecosystem creates opportunities for firms to improve their capability, however the specific cause of ventures capability development has not been clearly delimited. Governments, industrial park developers and resident firms in Ethiopia

experience multi-faceted challenges, such as complications associated with administrative and regulatory capacity building, coordinating key actors and stakeholders, infrastructure and public utility provision, financing issues, skills development, and linkages with local economies (UNIDO, 2018). These challenges have weakened the contribution of entrepreneurial ecosystem on the various aspects of small ventures capability improvement. Sadly, IPs are not open for small firms even in their strategic plan.

The World Economic Forum (2013) survey, for example, consistently suggests that access to markets, human capital, and money are the most essential factors in the success of entrepreneurial firms. However, these should be viewed as luxuries rather than basic determinants of ecosystem success; after all, human resources and finance are heavily reliant on the underlying institutions of education and financial markets (Acemoglu et al., 2005). If these characteristics are not well accessed, it will have a detrimental impact on the development of a successful entrepreneurial ecosystem.

4.3. The role of academia-industry linkage

Firm's capability can be viewed from various perspectives. For instance, a firm's capability viewed as actions, processes, systems and relationships that the company can carry out with its own resources (Sánchez, 2011). Beyond these findings, in this study we have identified the specific association of the entrepreneurial ecosystem and other variables with the technological and firm resource capabilities independently. Small firms perceived that joining widen scope of business environment (IPs) enhances business operations and capability. Currently, integrating higher educations with small firms and incorporating small firms in IPs are not well exercised or implemented. Practically, the current Ethiopia's industrial policy reform more emphasize on strong linkage between industry and agriculture; not industry and university (Alebel, 2017).

Even though the practice of AIL is poor in low-income economy, there is a strong contribution to the improvement of industrial parks entrepreneurial ecosystem. The concentration of small firms around clusters and centres will have an opportunity to access infrastructures and services that improve entrepreneurial ecosystem. Particularly, academic institutions offer small firms' knowledge and technologies used for innovation, pursue and exploit opportunities related to cooperation with firms from their industrial clusters, gain access to the resource base, knowledge owned by university, solve the industrial problems, improves knowledge infrastructure (Gulbrandsen and Solesvik, 2015), and enriched with innovation capabilities (Liu, 2009). In support to the above findings, our finding shows that there is a significant moderation from academia-industry linkage on the relationship between entrepreneurial ecosystem and firm's capability (i.e., resources) improvement.

Interesting arguments about the positive impact of industrial linkages can also be found in a sizable number of empirical studies on industrial clustering (Hu et al., 2011). That is, as we make universities entrepreneurially oriented, the universities and industries build good entrepreneurial ecosystem that supports the firms to improve their capability. At the firm-level scale, many other scholars have accepted the notion that linkage benefits derived from cluster occupancy led to superior firm performance

(Hu et al., 2011) and contribute towards improved industrial competitiveness (Bhutto and Lohana, 2018). All these improvements have been associated with the development and improvement of small firm's capability. This progress will be recorded with the improvement in the firm's capability. Consistently, the presence of academia-industry-linkage contributes for the improvement of small firm's technological capability.

4.4. The role of entrepreneurial skills and managerial knowledge

The RBV and other existing research indicated that entrepreneurial skills facilitated enterprise performance (Al Mamun, 2019). Several empirical studies also show that there is a significant relationship between a firm's capabilities and its performance (Kamasak, 2017). All the above findings were considered firms capability as predictor. However, there is a necessity to study the building block and determinants of firm's capability, which are underestimated in the previous studies. Therefore, this study identifies this forgotten area and tests the various predictors of firm's capability such as entrepreneurial ecosystem, entrepreneurial skill, and managerial knowledge. Even though knowledge-based resources are associated with innovation capability, marketing capabilities and different production capabilities which are vital firm resources (Kamasak, 2017), there is a necessity to identify how separately the managerial knowledge improves the resources capability. There are also researchers that argue management team may satisfy the conditions for achieving competitive advantage' (Carmeli and Tishler, 2004). However, before going further relationship with competitive advantage, we found the necessity to test the role of managerial knowledge and entrepreneurial skills on building and/or improving firms' capability.

The government should encourage small firms and provide support in utilizing the skills and competencies of small manufacturing sectors to improve their capability. In terms of the relevance of entrepreneurial skill, Camisón et al. (2009) also indicate that organizational systems emphasize the development of skills, and the degree to which the members of the organization are committed to the goals of the firm and knowledge. Similarly, Montresor (2004) argued that, both declarative and procedural knowledge are a company's resource and empower companies' competence which in return leads to better performance (**Table 4**).

Many of the previous studies focuses on looking the impact of entrepreneurial skills on competitive advantage and firm's performance. For instance, there are scholars who argue that Entrepreneurial skills are essential for determining the use of resources to achieve competitive advantages (Kim et al., 2011). Others argue entrepreneurial skills can contribute further to enterprise performance, growth and profitability (Al Mamun, 2019). Consistently we found that entrepreneurial skill influences the firm's technological capability and mediates the influence of entrepreneurial ecosystem on technological capability improvement. This study revealed that entrepreneurs necessitated a skill that will improve the capability of small firms. These capabilities are developed from the entrepreneurial ecosystem domain of cultural, policies, finance, human capital, friendly markets and etc., aspects. This skill that emanates from this ecosystem helps to build and develop both technological

capabilities. More specifically, the entrepreneurial competencies in industrial parks entrepreneurial ecosystem plays a role on the development of entrepreneurial skill, which in turn instigates technological capabilities. Through this skill, a set of activities and processes were developed and contributes for firm's capability improvement.

Table 4. Regression coefficient (OLS regression analysis).

		Technological capability		**Resource capability**	
		Coefficients	***T***	**Coefficients**	***T***
		***B* (Std. Error)**		***B* (Std. Error)**	
Path 1	**DV: Technological capability**			**DV: Resource Capability**	
	R = 0.491 R^2 = 0.241 Sig. =0.000			R = 0.186 R^2 = 0.035 Sig. = 0.003	
	(Constant)	0.902	3.169***	4.238	14.034***
	IPEE	0.711	8.796***	−0.253	−2.951***
Path 2	**DV: Entr, Skill**			**DV: Man. Knowledge**	
	R = 0.018 R^2 = 0.000 Sig. = 0.774			R = 0.130 R^2 = 0.017 Sig. = 0.042	
	(Constant)	3.565	6.488***	4.367	10.322
	IPEE	−0.045	−0.288		−0.246 −2.043**
Path 3	**DV: Technological capability**				**DV: Resource capability**
	R = 0.494 R^2 = 0.244 Sig. = 0.000				R = 0.204 R^2 = 0.042 Sig. = 0.006
	(Constant	1.254	3.269***	4.503	12.451***
	IPEE	0.710	8.508***	−0.268	−3.102***
	Ent. Skill	−0.030	−0.897	-	-
	Man. Knowledge	-	-	−0.061	−1.324
Total effect	IPEE*Ent.Skill			IPEE*Man.Knowledge	
	IPEE*Ent.Skill	0.003		-	
	IPEE*Man.Know	-		0.007	

Source: SPSS Computation (2024).

As several studies indicates, the knowledge-based resources are associated with innovation capability, marketing capabilities and different production capabilities which are vital firm resources (Kamasak, 2017). Managers should also be equipped with the knowledge required to build these and other capabilities. However, there is a necessity to view how separately the managerial knowledge improves the resources capability. Even though there are no studies directly tested the role of entrepreneurial ecosystem through managerial skill on improving firms' capability was not identified, Morgan, et al., (2003) argue that knowledge creates the most strategically significant resources (Costa et al., 2019). However, before going further relationship with competitive advantage, we found the necessity to test the role of managerial knowledge on building and/or improving firms' capability. Accordingly, resource capabilities necessitated the appropriate managerial knowledge of planning, organizing, directing and controlling. This knowledge enables managers to examine the 5Ws (what, when, why, who, and where), organize, and execute the activities to be performed. By performing these activities properly, managers build and develop and build a firm resource capability.

5. Conclusion and implications

5.1. Conclusion

The entrepreneurial ecosystem requires a strong government commitment in various area of incorporating small and local enterprises through linking to academic institutions. However, many barriers hindered the development of strong entrepreneurial ecosystem in Ethiopia, such as, human capital, institutional, financial, market, policies and legal procedures, cultural and resource barriers. Similarly, awareness about academia-industry linkage is not sufficient among small enterprise owners. But it's believed that operating business in industrial parks improves the small firm's capability (both technological and resources capabilities).

The study reveals a strong correlation between the entrepreneurial ecosystem in industrial parks and firms' technological capability. The firm's technological capability improvement is significantly correlated with independent variables such as types of industry or sector, industrial parks entrepreneurial ecosystem, and entrepreneurial managerial knowledge. Similarly, firm's resource capability improvement is significantly correlated with firm's size and industrial parks entrepreneurial ecosystem. Besides, the entrepreneurial ecosystem influences the resources capability more when academia-industry linkage existed. The study identified the specific association of the entrepreneurial ecosystem and other variables with the technological and firm resource capabilities independently. Small firms perceived that joining a widen scope of business environment (IPs) enhances business operations and capability. Currently, integrating higher educations with small firms and incorporating small firms in IPs are not well exercised or implemented.

The study also found that the interaction between entrepreneurial ecosystem and AIL has no impact on technology capability improvement, while there is significant influence on resource capability improvement. The improvement of the entrepreneurial ecosystem was measured in terms of infrastructure, government support, market opportunity, pool of human capital, reputation, minimum risk, and access to other resources. However, the specific cause of venture capability development has not been clearly delimited. The presence of academia-industry linkage contributes for the improvement of small firm's technological capability. The study also tests various predictors of firm's capability, such as entrepreneurial ecosystem, entrepreneurial skill, and managerial knowledge. Entrepreneurial skills influence the firm's technological capability and mediate the influence of the entrepreneurial ecosystem on technological capability improvement.

5.2. Implications for practitioners

Small scale enterprises sector has been recognized as an integral component of economic development and a crucial element in the effort to lift countries out of poverty. More importantly, Ethiopia is constructing industrial parks on selected economic corridors. Apart of this, the room for small business in these parks is too narrow. Thus, outcome of this study will serve as an input for Ethiopian policymakers, which helps them to develop inclusive policies towards industrial parks and forward suggestion to both parties on integration between small scale firms and industrial

parks. Besides, it's found that the influence of entrepreneurial ecosystem on the firm's capability improvement is better when firms made a linkage with academic institutions. Therefore, this paper clearly shows the importance of the integration to the Ethiopian government officials, who might use the study as a steppingstone to improve the integration between higher educations and small firms. This may also be accomplished through incorporating small enterprises to industrial parks and improving the entrepreneurial ecosystem that contributes to improve firms' capabilities. Moreover, it provides a clue for managers of small firms in improving their firms technological and resource capabilities through building managerial knowledge and entrepreneurial skills which in return, allows them to make a right decision regarding their investment.

5.3. Limitations and future research implications

This study is among the first in testing the role of AIL, entrepreneurial skill, and knowledge management in the relationship between IPs entrepreneurial ecosystem on firm's capability. However, it is not beyond limitations. First, the items used to measure IPs entrepreneurial ecosystem and firm capability is developed for this study since standardized items are not developed yet. Therefore, the future research should conduct a detailed analysis, modify, and standardize the items used to measure the specified variables. Second, this study focused mainly on small enterprises and industrial parks. But it has paramount importance if all the participants of IPs including foreign enterprises and larger enterprises in IPs are considered. Therefore, future researchers must compare the different types of firms in the IPs ecosystem. Third, the sample size is not sufficient to represent all the small manufacturing enterprises in Ethiopia. Therefore, we forwarded implications for future researchers to take more sample size from different corner of the country to get more generalization.

Fourth, a variety of theories, including those pertaining to dynamic capacities, transaction costs, RBV, and other concepts, may be used to mediate the impact of the entrepreneurial ecosystem on a firm's capability. However, no such test was run for this study. Thus, to determine whether there has been a significant change in the outcome, future researchers may take this interaction into account. Finally, there are variety of factors that related to the IPs entrepreneurial ecosystems and firm's capability. For instance, specifying the barriers for small enterprises to enter the IPs, the role of firm resources, and the role firm's internal operations has expected to play a paramount role. Then, future researchers are expected to identify and test these variables in relation to the IPs entrepreneurial ecosystem and firm capability. We also expect from future researchers consider longitudinal studies and explore additional factors to inform evidence-based policies in developing economies.

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Appendix

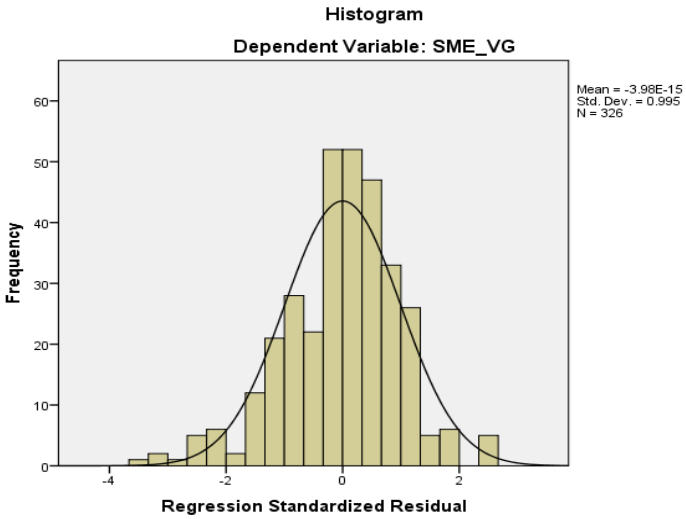

Figure A1. Histogram.

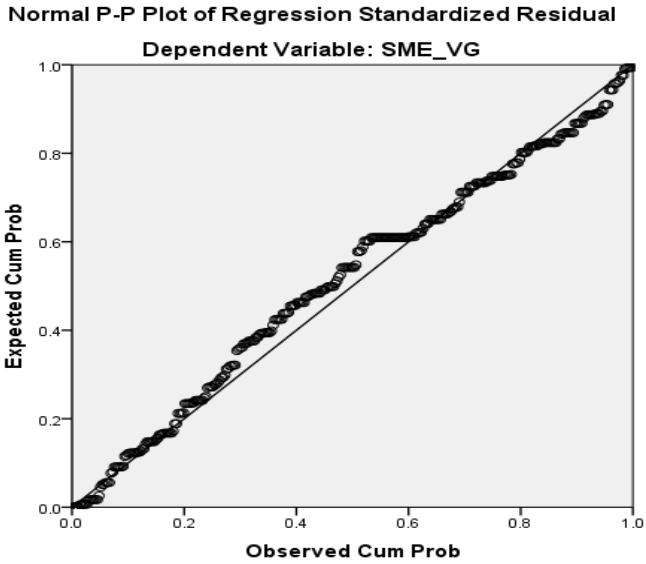

Figure A2. Homoscedasticity chart.

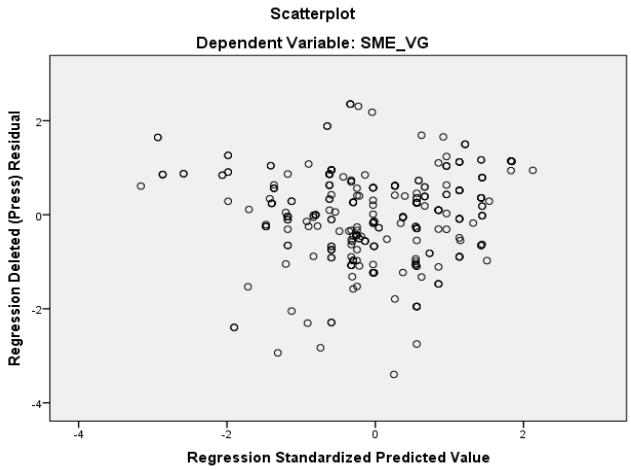

Figure A3. Scatterplot.